SPECIFICATION

[Electronic Version 1.2.8]

[Three Dimensional Mapping of All-Connect Graph to Create Strong Three Dimensional Structures]

Summary of Invention

[0001] In 1979 the applicant solved the problem of finding minimal paths around n-dimensional cubes. In the process, he solved the problem for minimal paths around n-dimensional simplexes as well. A simplex is equivalently a graph on n+1 points connecting each point to every other. If these points are arranged around a circle , like the hours on a clock, the graph creates a figure of great symmetry, sometimes called a mandala. (See http://cosy.com/cosylogo.htm containing the paper "Euler Cycles and Pretty Pictures", 1979.) At that time , the applicant created several large computer pen plotter images of mandalas of up to 50 points.

[0002] The applicant lives about a thousand meters from the site of the World Trade Center. In August 2002, when with the difficulties of the aftermath of their destruction, the applicant was having to downsize his living arrangements, requiring the careful moving and storage of the large 23-year-old 50-point computer plot. At that time, the competition for the design for a new World Center was putatively still open. These factors converged in the notion that grabbing the center of an all-connect mandala and pulling it out into a conical spire would make a beautiful, because of its enormous symmetry, and extremely strong shell appropriate for such a monumental life-space. It may be particularly attractive as the shell for a skyscraper in seismic zones. (See http://cosy.com/CoSy/ConicAllConnect/ for in situ rendering.)

[0003] The applicant lives and works in an interactive programming environment in a very powerful computing language, and thus had the tools to solve the algorithms necessary to compute the list of beam lengths required to construct the structure itself, and the images included here.

Detailed Description

[0004] An "all-Connect" or "complete" graph on N points is a web formed by lines connecting each point to all others. Any all-connect graph is equivalent to a projection of an N-1 dimensional simplex onto two dimensions. When the N points are arranged evenly around a circle the graph is a figure of great symmetry (Figure 1) which therefore distributes forces from any direction to all other points. When N is even, this includes radial elements crossing the center of the circle.

[0005] Mapping each vertex of the all-connect to a third dimension based on its distance from the center of the circle produces a conic structure inheriting these properties (Figure 2).

[0006] This structure may form the outer skeleton of a building or enclosed space .

[0007] Figures 1 and 2 were produced by a computer algorithm generating a list of all line segments (beams) required to construct such a structure .